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Allen

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(54) **CONTINUED GOLF IRON FACETONGUE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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A63B 53/04 (2015.01)

(52) **U.S. Cl.**
CPC ***A63B 53/047*** (2013.01)

(58) **Field of Classification Search**
CPC A63B 53/047; A63B 59/0092; A63B 2053/0408; A63B 49/06; A63B 60/52; A63B 60/54
USPC 473/324–350, 287–292, 219–256
See application file for complete search history.

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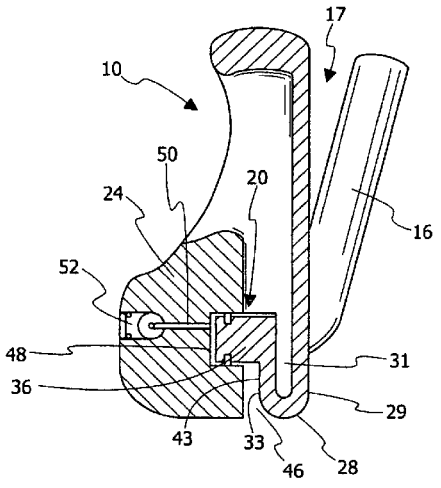
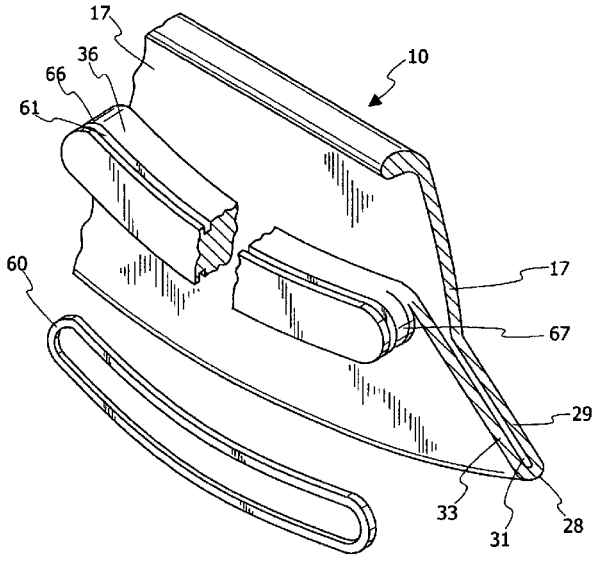
(57) **ABSTRACT**

A golf iron clubhead configuration for increasing and controlling face flexure while stabilizing the face in all directions other than the flexure direction and reducing face vibration. The two features that contribute to these results are firstly to free the facewall from z axis restraint by the other portions of the clubhead to the maximum extent possible, limited by clubhead integrity. The second is to stabilize the free face in x and y coordinates of the facial plane with a horizontally elongated tongue or piston attached indirectly, not directly to the face. This tongue slides and is stabilized in a tight-fitting lubricated groove in the rear of the clubhead positioned downwardly from the geometric center of the clubface.

11 Claims, 3 Drawing Sheets





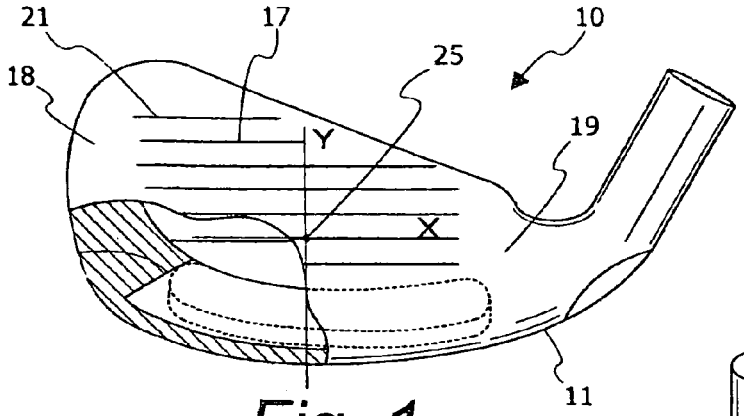


Fig. 1

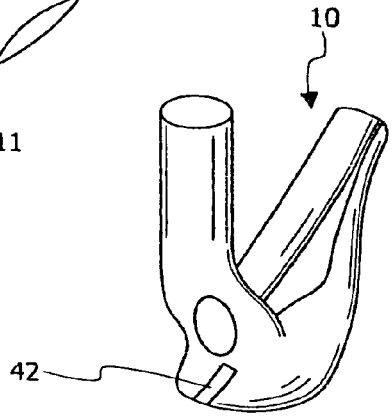


Fig. 2

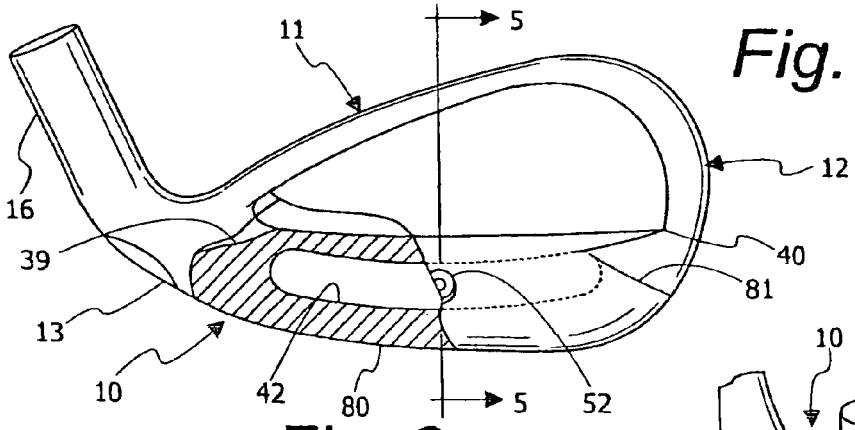


Fig. 3

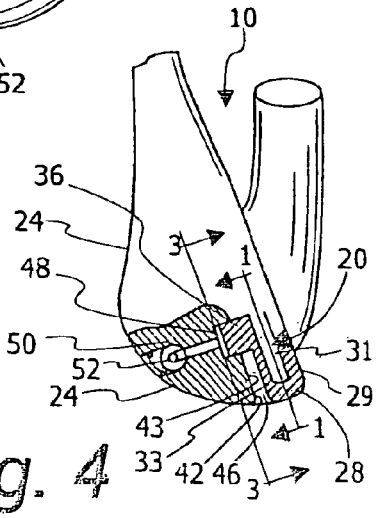


Fig. 4

Fig. 5

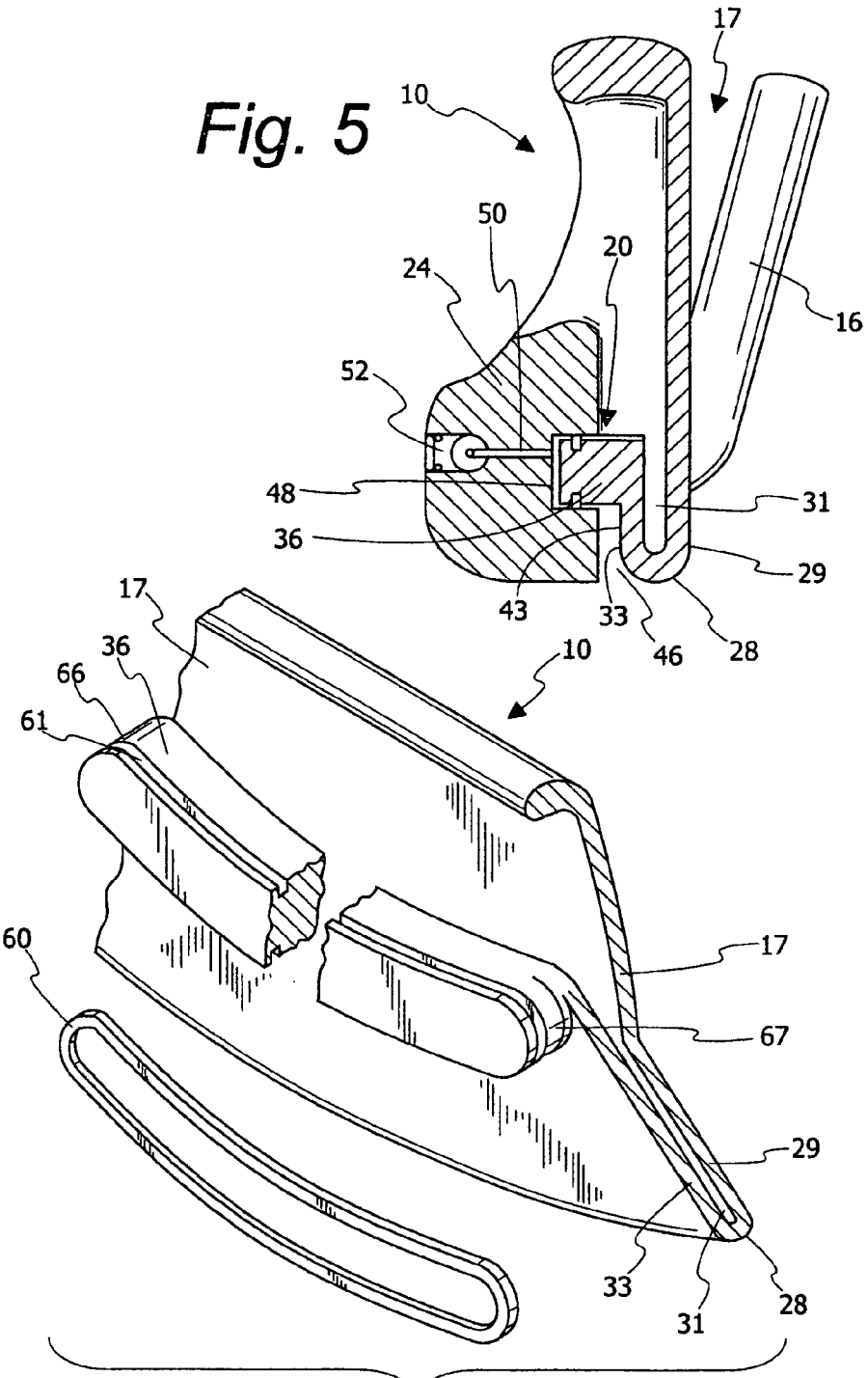

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Fig. 6

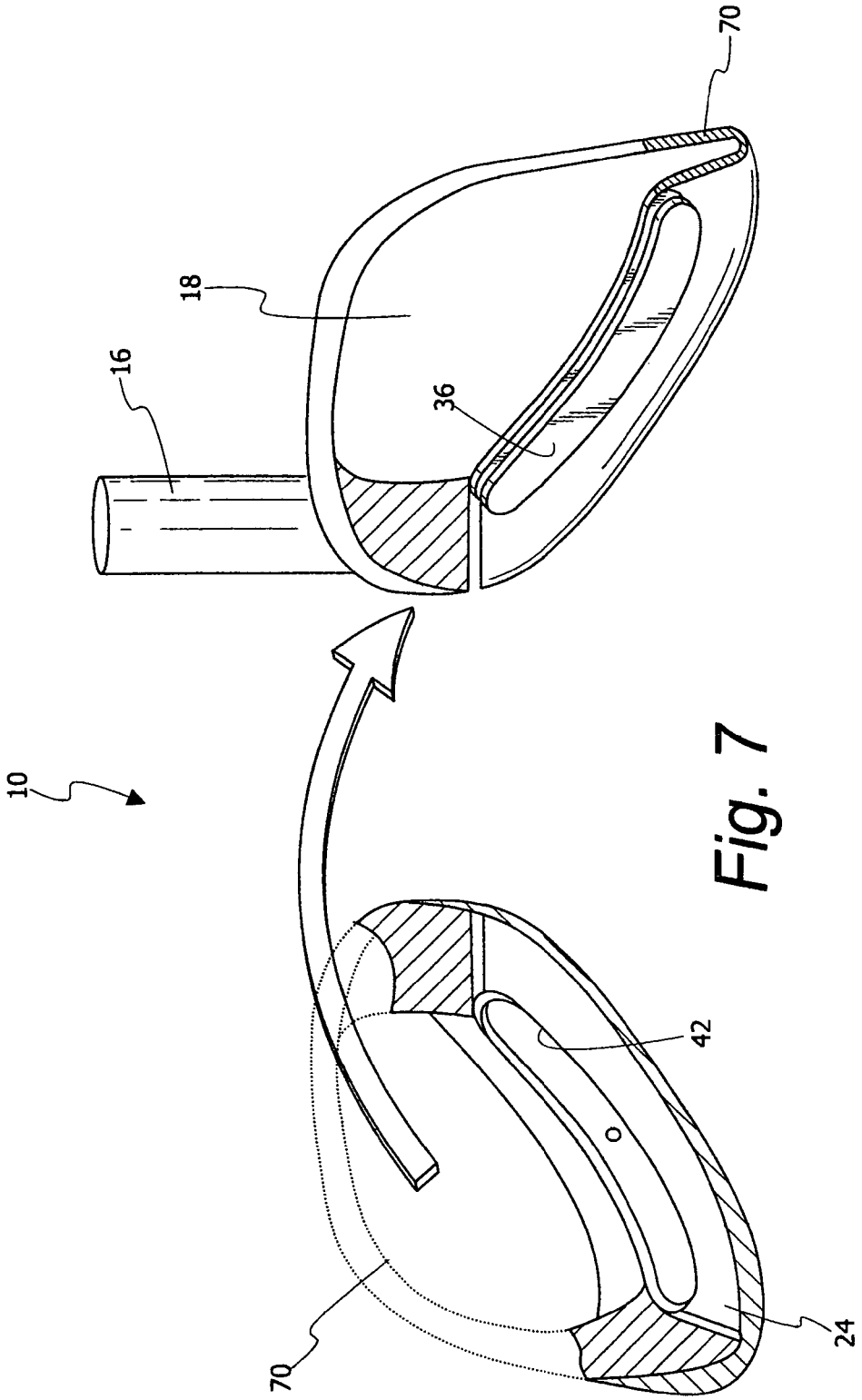

Fig. 7

CONTINUED GOLF IRON FACETONGUE

RELATED APPLICATION

This application is a continuation of U.S. patent application Ser. No. 13/741,500, filed Jan. 15, 2013, entitled "GOLF IRON FACETONGUE", now U.S. Pat. No. 8,911,301, issued Dec. 16, 2014, forming the basis for a Reissue application Ser. No. 14/677,820, filed Apr. 2, 2015, entitled "GOLF IRON FACETONGUE", and is a continuation of U.S. Ser. No. 14/657,859, filed Mar. 13, 2015, entitled "GOLF IRON CLUBHEAD WITH EXPANDED FACETONGUE".

BACKGROUND OF THE INVENTION

Club designers, including myself, have worked indefatigably over the last 20 years to improve golf ball distance travel by using various techniques to increase the spring effect of the clubhead facewall as it impacts the ball for a relatively few milliseconds. Contact between the clubface and ball occurs usually over only a distance of less than about 0.5 inches, even with driver type clubs.

Once considered illegal by the mercurial governing golf body, the United States Golf Association (USGA), such spring-like effect is now considered within the USGA Rules, as well as the Rules of the European R & A (Royal and Ancient) body.

Designers have approached these objectives in a variety of ways. One successful approach has been the thinning of the facewall around its perimeter so it flexes more where the facewall joins the crown wall, the toe wall, the heel wall and the sole wall. Another technique employed by Adams Golf, for example, is to form a slot in the sole wall just to the rear of the facewall and parallel thereto. Another similar technique is incorporated into the Taylormade Rocketbladez irons.

A third design, shown in the Blankenship, U.S. Pat. No. 7,288,030, assigned to Karsten Manufacturing Co., never adopted in any commercial club, shows two pistons attached to the rear surface that are dampened by a magnetic fluid in the piston chambers.

The problem in all these designs is that they do not satisfy the necessary face flexure criteria set forth in the abstract. That is, none of these designs frees the facewall to the maximum extent possible and hence have only limited face flexure.

It is a primary object of the present invention to ameliorate the above problems in the prior art.

SUMMARY OF THE PRESENT INVENTION

In accordance with the present invention, a golf iron clubhead configuration is provided for increasing and controlling face flexure while stabilizing the face in all directions other than the flexure direction and reducing face vibration. The two features that contribute to these results are firstly to free the facewall from z axis restraint by the other portions of the clubhead to the maximum extent possible, limited by clubhead integrity. The second is to stabilize the free face in x and y coordinates of the facial plane with a horizontally elongated tongue or piston attached indirectly, not directly, to the face. This tongue slides and is stabilized in a tight fitting lubricated groove in the rear of the clubhead positioned downwardly from the geometric center of the clubface.

As set forth in patent application U.S. Ser. No. 13/741,500, facewall freedom is affected by a "U" shaped channel just behind and running along the entire length of the lower edge of the facewall. The rear leg of this channel extends vertically upwardly behind and parallel to the facewall. The upper edge of the rear leg has unrestricted movement fore and aft along the clubhead target line, which distinguishes this technique. Also, the wall extends significantly into both the toe and the heel of the clubhead to increase face flexure.

An arcuate horizontally elongated tongue is formed on the rear surface of the rear leg that slides in a complementary groove or cylinder in the rear of the clubhead. The tongue is dampened in x and y directions and fitted to the groove with a PTFE ring and the groove is lubricated with pure silicone oil injected through an Alemite flush-mount fitting in the rear of the clubhead. The elongated tongue and cylinder configuration thereby stabilizes the face in x-y directions across the face of the clubface (x and y designations refer to orthogonal coordinates on the facewall in the plane of the facewall, the z axis falling perpendicular to the facewall at the geometric center of the facewall).

It should be understood that piston oriented or incorporating clubheads have been commonplace in the prior art to reinforce clubfaces. In fact, in my own U.S. Pat. No. 5,873,791 issued Feb. 23, 1999, I disclose a piston reinforced face clubhead that won 6th place in the Long Drive National Championship in Las Vegas in 1996. And the Blankenship, U.S. Pat. No. 7,288,030, assigned to Karsten Manufacturing Corporation, shows a piston also connected to the clubface. However, all of these piston devices are connected directly to the rear of the clubface and thus reinforce the face rather than freeing the face for maximum flexure. The present invention solves this problem by isolating the piston or tongue from the rear of the clubface, utilizing only the perimeter of the clubface as the point of attachment.

It should also be understood that the specific embodiment of the present invention is incorporated into iron-type golf clubs because the metal thickness behind the facewall provides increased opportunity to house the presently designed tongue and groove. However, it may be that some future visionary may well adopt these principles into a metal wood-type club so that possibility is within the scope of the present invention and that the term "iron" in the Claims is intended to be only preferable and not limiting.

Other objects and advantages will appear more clearly from the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front view of an iron clubhead with the present golf iron facetongue broken away at the toe to show part of the tongue;

FIG. **2** is a right side view of an iron clubhead with the present golf iron facetongue shown in FIG. **1**, showing the heel portion of the tongue slot;

FIG. **3** is a rear view of an iron clubhead with the present golf iron facetongue shown in FIG. **1**, broken away at the heel illustrating the clubhead body tongue cavity;

FIG. **4** is a left side view of an iron clubhead With the present golf iron facetongue shown in FIG. **1**, with the toe broken away to show the tongue, cylinder, and lubrication system;

FIG. **5** is an enlarged view of an iron clubhead with the present golf iron facetongue shown in FIG. **1**, taken generally along line **5-5** of FIG. **3**;

FIG. **6** is an enlarged perspective of the control section of the iron clubhead with the present golf iron facetongue as shown in FIG. **1**, partly exploded, and;

FIG. **7** is an exploded view of an iron clubhead with the present golf iron facetongue as shown in FIG. **1**, with the front of the clubhead separated from the rear at approximately the toe and heel of the clubhead.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the drawings and particularly FIGS. **1** to **4**, the present golf iron clubhead is depicted generally by the reference numeral **10** and incorporates the golf iron facetongue technology of the present invention. As seen in these figures, the iron clubhead **10** is seen to include a clubhead body **11** with a toe portion **12** and a heel portion **13** with a hosel **16** extending upwardly from the heel portion **13** and a generally planar facewall **17** having a toe portion **18** and a heel portion **19** and generally parallel horizontal grooves **21**.

As seen clearly in part cross section in FIG. **4**, the present invention includes a tongue and groove assembly **20** that acts to free the facewall **17** for maximum flexation because it is connected only to the extreme bottom of facewall **17**, and at the same time stabilizes the facewall **17** in the x and y coordinates lying in the facewall as depicted in FIG. **1** about the geometric center **25** of the facewall.

The tongue and groove assembly **20** includes an extreme lower portion of facewall **17** designated **29** in FIG. **4** included in a U-shaped flange **28** that includes an upwardly extending wall **33**, arcuate tongue **36**, arcuate portion complementary cylinder or groove **42**, extending parallel to the clubface **17** in rear portion **24** of the clubhead **10**.

Slot **31** (the first slot), defined by U-shaped flange **28**, behind the clubface **17** extends toward the toe all the way to point **40** indicated in FIG. **3**, and also extends to point **39** in FIG. **3** at the heel portion **13** of the clubhead to maximize the freedom of flexation of clubface **17**.

Because the arcuate portion of tongue **36** slides in complementary cylinder or groove **42**, it is also characterized as a piston supported by U-shaped flange **28** and upwardly extending integral wall **33**.

The slot **46** (the second slot) between wall **33** and rear clubhead portion **24** is approximately at 0.075 inches, and extends from diagonal line **81** at the toe and diagonal line **39** at the heel.

The tongue portion **36** is arcuate in configuration approximately complementing the curvature of the lower sole edge **80** of the clubhead body **11** and is struck about a radius of approximately 8.5 inches extending through and above geometric center **25** of clubface **17** along y axis in FIG. **1**, lying in a vertical plane along the target line. This is an important aspect of the present invention to promote face stabilization.

The fundamental purpose of the tongue and groove assembly **20** is to stabilize the clubface about the x and y coordinates illustrated in FIG. **1**, and is not to inhibit in any way the flexure of the clubface **17** along its z axis.

It should be noted that the groove **31** between wall portion **29** and wall **33** is approximately 0.080 inch in width, while groove **46** between wall **33** and wall **43** in rearward body portion **24** is approximately 0.075 inch as noted.

The chamber **48** at the rear of cylinder **42** between the end of tongue **36** and the rearward body portion **24** is lubricated by a passage **50** extending perpendicular to face **17** through body portion **24** and is fed lubricant through an Alemite-type flush mount fitting **52** mounted in rear surface **54** of rearward body portion **24**. Alemite fitting **52** is essentially a check valve that prevents the outflow of lubricant from passage **50** and chamber **48** after lubricant is dispensed through fitting **52** by a conventional small dose hand-lever actuated cartridge pump commercially available.

It should be understood that the chamber **48** operates at ambient pressure and the viscosity in the chamber **48** is not altered by the addition of lubricant through fitting **52**, which is a very low viscosity 100 percent silicone thin film lubricant, which is almost water-like in viscosity and that the pressure of fluid or air in chamber **48** has no effect on the movement of piston **36** in groove **42**.

As seen in FIG. **6**, a polytetrafluoroethelene (PTFE) ring **60** seats in a rectangular peripheral groove **61** extending completely around tongue **36** for the purpose of sealing the tongue **36** in the groove **42** and for preventing the escape of lubricant from chamber **48**, and at the same time acting as a vibration dampening element solely in the x and y coordinates illustrated in FIG. **1** to stabilize the facewall **17** during impact of the golf club on the forward surface of the facewall **17**.

The extension of groove **46** to angular line **40** at the toe of the club and to angular line **39** at the heel club increases the flexibility of not only the facewall **17** but also the upwardly extending wall **33** to maximize clubface flexure.

The arcuate tongue portion **36** slides in the closely fitted complementary arcuate groove **42** in the rear portion **24** of the clubhead **11** with a clearance of only about 0.010 inch.

It is an important aspect of the present invention that the tongue portion **36** is not only arcuate in configuration and has a radius of approximately 8.5 inches, but also that the groove **42**, as well as the tongue **36**, extend substantial distances on the toe and heel side of the geometric center of the face approximately a distance of 0.750 to 1.00 inch, and substantially below the geometric center, although the exact extent of toe and heel extension of the tongue **36** and groove can be more precisely determined by further experimentation.

As seen in FIG. **6**, tongue **36** has a fore to aft depth of approximately 0.190 inch.

The tongue portion **36** also has a vertical height of about 0.190 inch and the arcuate groove **42** has a vertical height of about 0.210 inch. Furthermore, the ends of the tongue portion **36** and groove **42** are semi-circular in configuration and consists of heel end **66** and toe end **67** having arcuate surfaces equal in diameter to the thickness of the tongue **36** and groove **42** respectively.

Referring to FIG. **7**, it should be understood that rear portion **24**, at the left of FIG. **7**, is broken away from forward portion **70** of clubhead **10** to illustrate the groove **42** and the tongue portion **36** and that the drawing is meant to depict the rear and forward halves of the club in the rotationally exploded form to illustrate how they collapse and attach together by welding or fasteners.

It should also be understood that in manufacture that the forward portion of the club **70** and the rear portion of the club **24** could be molded or cast, or investment cast in separate pieces and that the two welded and fastened together, after casting. In this regard, in the left half of FIG. **7**, the forward portion of the clubhead **70** is depicted in dotted lines and does not mean that that is included in the rear portion **24**, which is attached to the forward portion **70** and that is only shown in FIG. **7** to illustrate the relative positioning of the rear portion **24** with respect to the forward portion **70** on the left side of the view.

The invention claimed is:

1. An iron golf clubhead, comprising: a clubhead body having a facewall with a forward ball striking surface and a lower portion, a toe portion, and a heel portion, a rearwardly extending portion, and a hosel extending generally upwardly from the heel portion; a piston support portion extending rearwardly from and connected rigidly to the lower portion of the facewall and extending upwardly therefrom, and a piston connected to and extending generally perpendicular to and rearwardly from the piston support portion, said piston being freely moveable in a direction perpendicular to the facewall, and a cylinder in the rearwardly extending portion complementary in shape to the piston and facing forwardly and freely slidable receiving the piston.

2. An iron golf clubhead as defined in claim 1, including a lubrication system for the cylinder in the cylinder for the rearwardly extending portion.

3. An iron golf clubhead as defined in claim 1, wherein the piston is arcuate with its lowest point near the target line on the clubhead.

4. An iron golf clubhead as defined in claim 1, wherein the piston is generally symmetrical about the geometric center of the clubface.

5. An iron golf clubhead as defined in claim 1, including a seal groove around the piston and a seal ring encompassing the groove.

6. An iron golf clubhead as defined in claim 1, including said facewall having a periphery, said facewall having at least a portion of the facewall free to move in a direction perpendicular to a plane containing the facewall.

7. An iron golf clubhead as defined in claim 1, wherein the piston is a horizontally elongated piston projecting rearwardly from a wall portion extending upwardly from the rearwardly extending portion.

8. An iron golf clubhead as defined in claim 7, wherein the rearwardly extending portion has a cylinder or groove complementary in shape to the elongated piston on the wall portion and opening forwardly.

9. An iron golf clubhead including a clubhead body having a facewall with a toe portion, a heel portion, and a rearwardly extending portion, a hosel extending generally upwardly from the heel portion, said facewall having a periphery, said facewall having a lower portion free to move in a direction perpendicular to a plane containing the facewall, and a piston and groove device connected to the free portion of the facewall to stabilize the facewall and extending rearwardly and then upwardly behind the facewall, and a horizontally elongated piston support portion projecting rearwardly from the lower portion of the facewall extending upwardly behind the facewall, said piston support portion including a piston connected to and projecting generally perpendicular to and rearwardly from the support portion, said piston being freely moveable in a direction perpendicular to the facewall, and a cylinder in the rearwardly extending portion slidably receiving the piston, including a lubrication system for the cylinder in the cylinder for the rearwardly projecting portion.

10. An iron golf clubhead including a clubhead body having a facewall with a toe portion, a heel portion, and a rearwardly extending portion, a hosel extending generally upwardly from the heel portion, said facewall having a periphery, said facewall having a lower portion free to move in a direction perpendicular to a plane containing the facewall, and a piston support portion extending rearwardly and then upwardly behind the facewall, and a horizontally elongated piston projecting rearwardly from the support portion, said piston projecting generally perpendicular to and rearwardly from the support portion, said piston being freely moveable in a direction perpendicular to the facewall wherein the piston is elongated and arcuate with its lowest point near a target line on the clubhead.

11. An iron golf clubhead as defined in claim 10, including a seal groove around the piston and a seal ring encompassing the piston.

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